Intensive Agriculture

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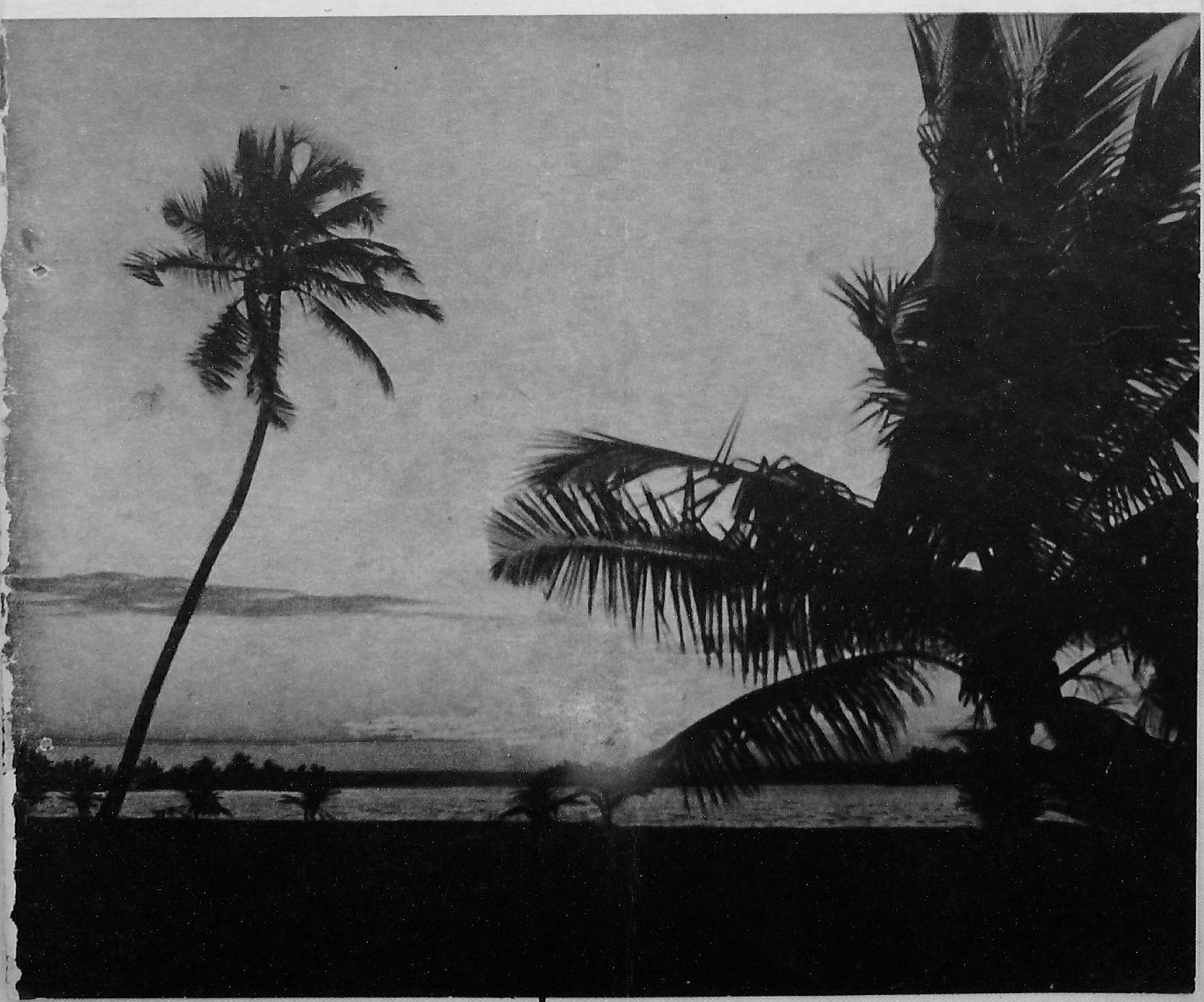

Intensive Agriculture

VOLUME 1. No. 6 AUGUST 1963

THE PICTURE ON THE COVER

Silhouetted against the glory of a setting sun, stand the tall and stately coconut palms rightly called kalpa vriksha. *Grown along the entire coastal belt of India, coconut palms yield a variety of economic products.*

212
33
245

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Associates

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New Delhi

TREES ARE YOUR FRIENDS

By M. L. N. IYENGAR

TREES are your friends; they support you and your agriculture in many ways. You need fuel. You need wood for your implements and poles for your fence posts. You need material for your house—for doors, windows, roofs and pillars. You need fodder for your cattle and green leaf for your fields. You need fruits to make your diet more nutritious and tasty. You and your cattle need shade in summer and protection from cold winds during winter. You also need flowers for worship and decoration.

Trees can give you all these. Trees mean wood and more wood means more fuel for your home and more manure for your fields and better crops. Trees mean more fodder for your cattle and more milk for you. If you plant sufficient number of trees around your fields and in village waste lands, they can protect your soil and your crops. And, trees add beauty to your home and village.

You have a variety of trees to select from to suit your needs and your locality.

WHERE TO PLANT TREES

You can plant trees around wells and ponds, in compounds and backyards, along village lanes, field boundaries, streams and channels and in village waste lands. You can all join in your village and raise a small community forest. If you have sufficient land or if some of your fields are too poor to give good crop yields, you can raise a small fuel plantation of casuarina, eucalyptus, etc. You may set apart a portion of your land for growing fruit, fodder and green-manure trees.

WHEN TO PLANT TREES

The best time for planting trees is at the beginning of the rainy season; they establish more quickly.

As you have to supply water to the plants till they grow big enough, you should make proper arrange-

ments for watering them after the rainy season is over or when the rains are delayed.

HOW TO GET PLANTS

You can raise your own plants without much difficulty. Many trees can be raised from seeds. Instead of planting the seeds in the field direct, raise a small nursery; you can look after the young delicate seedlings better.

SITE FOR NURSERY

Select a level plot with a deep, loamy soil near a well, pond or channel for your nursery.

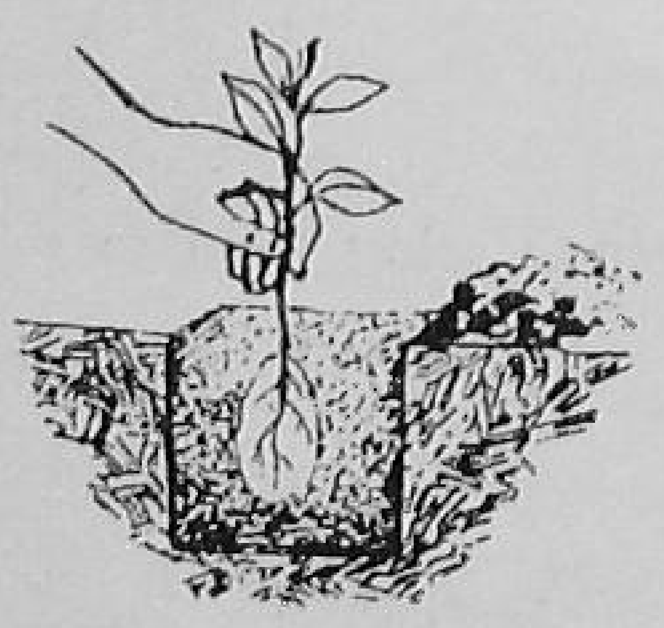
Raise a good fence round it to keep away cattle and other animals.

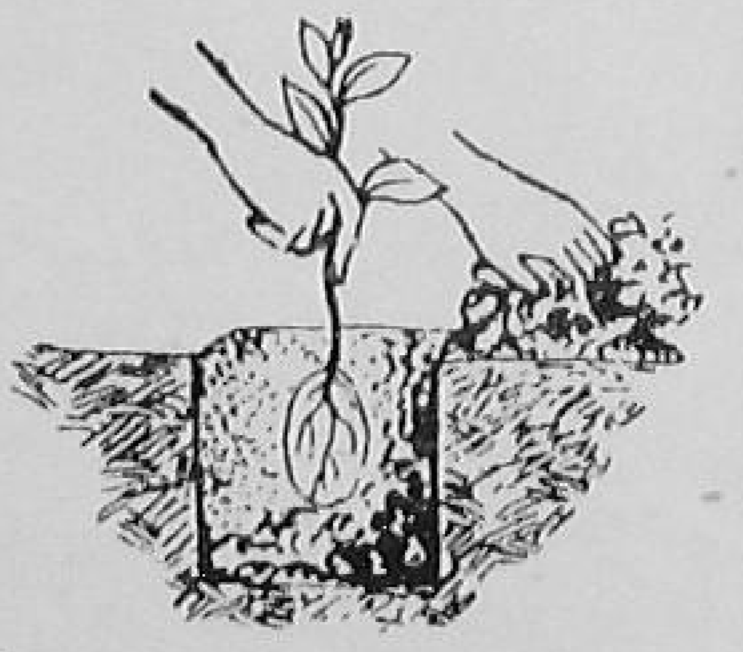
Preparation : Mark out bed three to four feet wide and of any convenient length. Dig to a depth of about two feet and allow the soil to weather for two or three months. Remove stones and old stumps, etc. Mix with the soil liberal quantities of farmyard manure, compost or leaf mould. If the soil is clayey add some sand.

Sow the seeds in rows. Water them regularly and carefully, with a rose-can if possible. Provide light shade with twigs, *chiks* or *thatties*. Keep the beds free from weeds.

There are some trees which you should not raise from seeds like some fruit trees. In such cases, it is better to buy plants from a reliable nurseryman.

With some plants like glyricidia, you can insert cuttings in the soil and allow them to root.

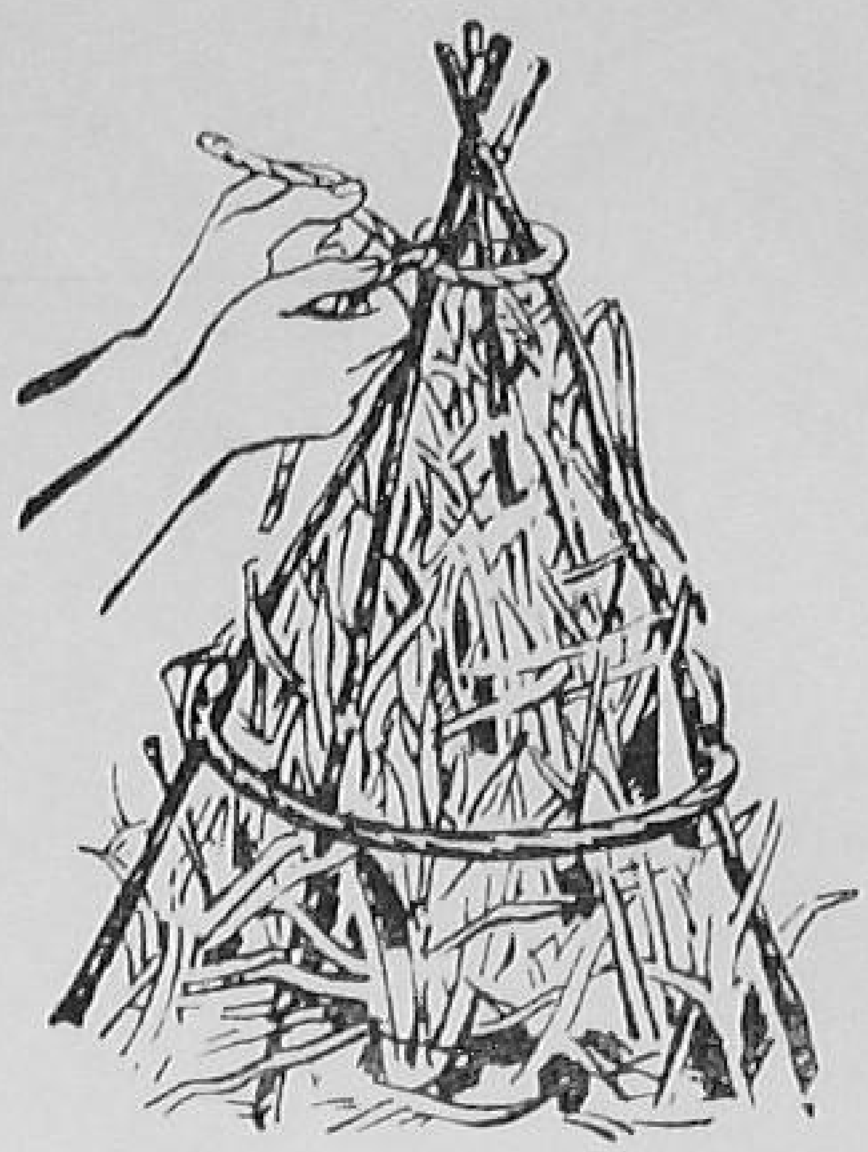




HOW TO PLANT TREES

Dig pits : If you are in a locality with good rainfall, plant the seedlings in pits, but if your area is in a very dry region, plant them in trenches.

Before the rains start, dig pits a foot long, one foot wide and one foot deep, 6 to 12 feet apart in either direction. For slow-growing trees, 6 feet by 6 feet or 12 feet by 12 feet would be more suitable. For fruit trees, the spacing should, of course, be wider—14 feet by 15 feet for small trees, 30 feet by 30 feet for medium-sized trees, and 60 feet by 60 feet for very large trees like mango, *jaman*, etc. In the case of



fruit trees and avenue trees, dig deeper pits—up to a depth of four feet.

Allow the soil to weather : Whether you dig pits or trenches, allow the soil to weather for a few weeks. Remove the stones and fill the pit with the weathered soil. In the case of trenches, fill only half the trench in a sloping manner so that a ridge is formed on the downward side. This will help in conserving rain water.

Planting : Dig out the seedlings carefully with a ball of earth attached to the roots. You can remove the seedling more easily if you water the nursery copiously a few hours before.

If the roots are too large and fibrous, as in some kinds of trees, you may trim them; otherwise, don't disturb the roots.

Plant the seedlings soon after removal from the ground. If there is any unavoidable delay, keep the seedlings moist in a shady place.

Plant the seedlings with the ball of earth, preferably on a rainy or cloudy day. After planting, press the soil round it.

Aftercare : Keep the plants free from weeds. Keep the top-soil loose by occasional stirring. Protect them against animals with tree guards. You may have mud walls or bricks or bamboo baskets as guards. You can also stick some thorny twigs.

If you have planted the seedlings in a grove, fence the area.

After the trees have grown up, you may have to thin them. The ideal spacing for small trees is 20 feet by 20 feet, for medium trees 35 feet by 35 feet, and for very large trees 60 feet by 60 feet.

Trees are your friends. Plant more trees.

A Whale of a Fish

An appreciative audience, which included the Union Minister for Agriculture, Dr. Ram Subhag Singh, and the Madhya Pradesh Chief Minister Shri B. A. Mandloi, saw the prize catla *in Bhopal recently*

YES, a single *catla* weighing three-quarters of a maund—neither less nor more.

This prize exhibit along with a few more—a 10-seer *mahaseer* and about a 15-seer *mrigal*—were exhibited at the Vegetable and Flower Show held at Bhopal recently in connection with the award of the 'RASHTRA KALASH' to Madhya Pradesh.

Prize exhibits like these are putting Madhya Pradesh on the fish-map of India. Already the State is exporting 50,000 maunds of fish to Calcutta and Delhi.

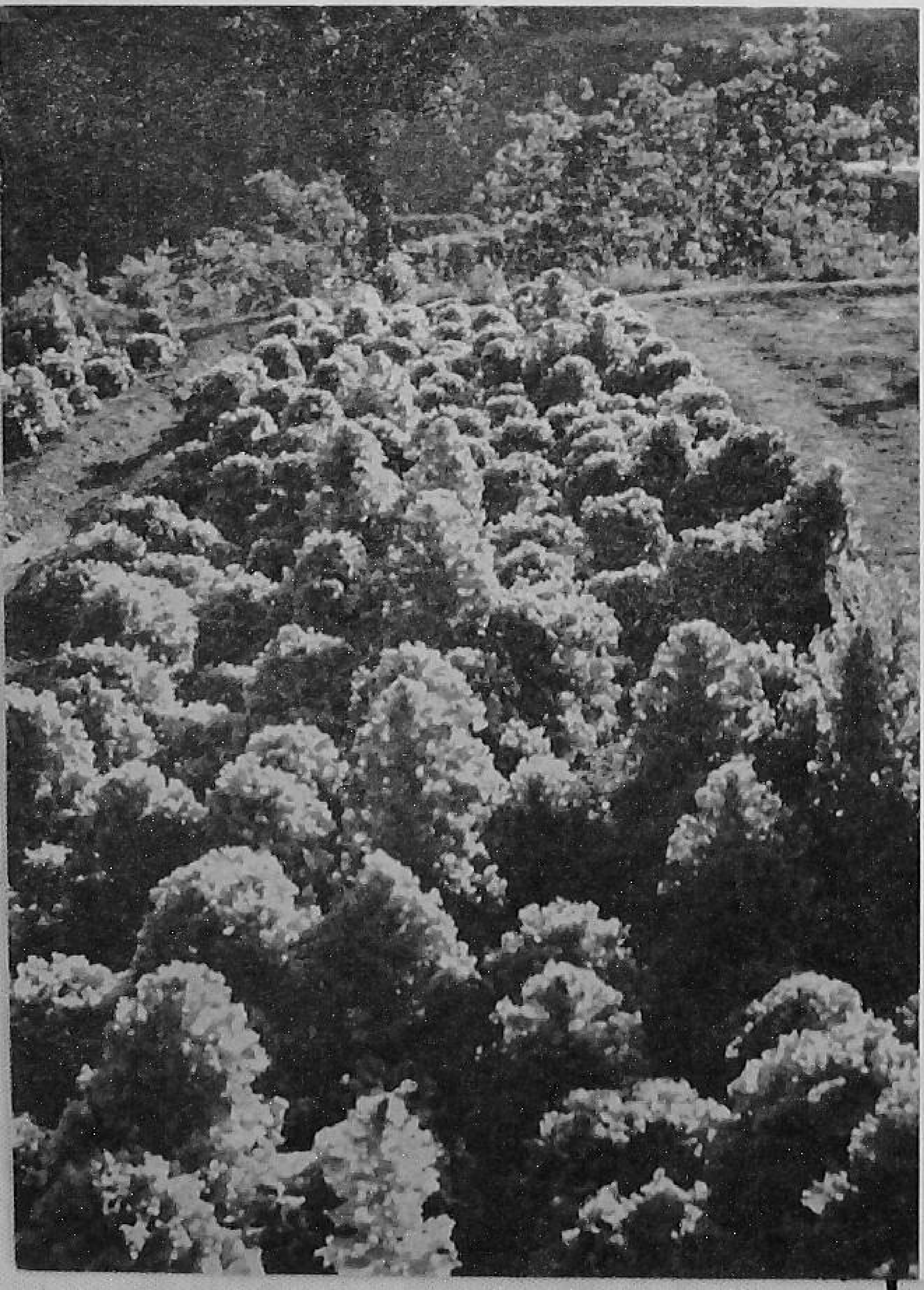
In 1962-63, nearly 1,200 Gram Panchayats, Fishermen Cooperative Societies and private fish farmers stocked over 78 lakhs of fry and fish, expected to yield nearly 57,000 maunds of fish worth Rs. 25 lakhs. But this is not all. The State Government plans to take up nearly 25,000 acres for fish culture by 1963-64.

Madhya Pradesh also is the only State where *mahaseer* is cultured. *Mahaseer* is very delicious and, what's more, its growth is equal to that of the other major crops. In fact, its seed is sent to other States in the country, and yes, even to Japan, where *mahaseer* fish seed was sent recently on Prince Akihoto's request.

—LAL

LETTUCE is getting popular in Cachar

By G. K. D. Roy
Officer-in-charge, Vijnan Mandir
Hailakandi, Cachar



FARMERS of Package District of Cachar in Assam have been growing many varieties of vegetables. But they had not taken to the cultivation of lettuce until this time. Lettuce is rich in Vitamins A and C. Green vegetable salads, made with lettuce, tomatoes, carrot, radish, etc., make a nourishing item in our diet.

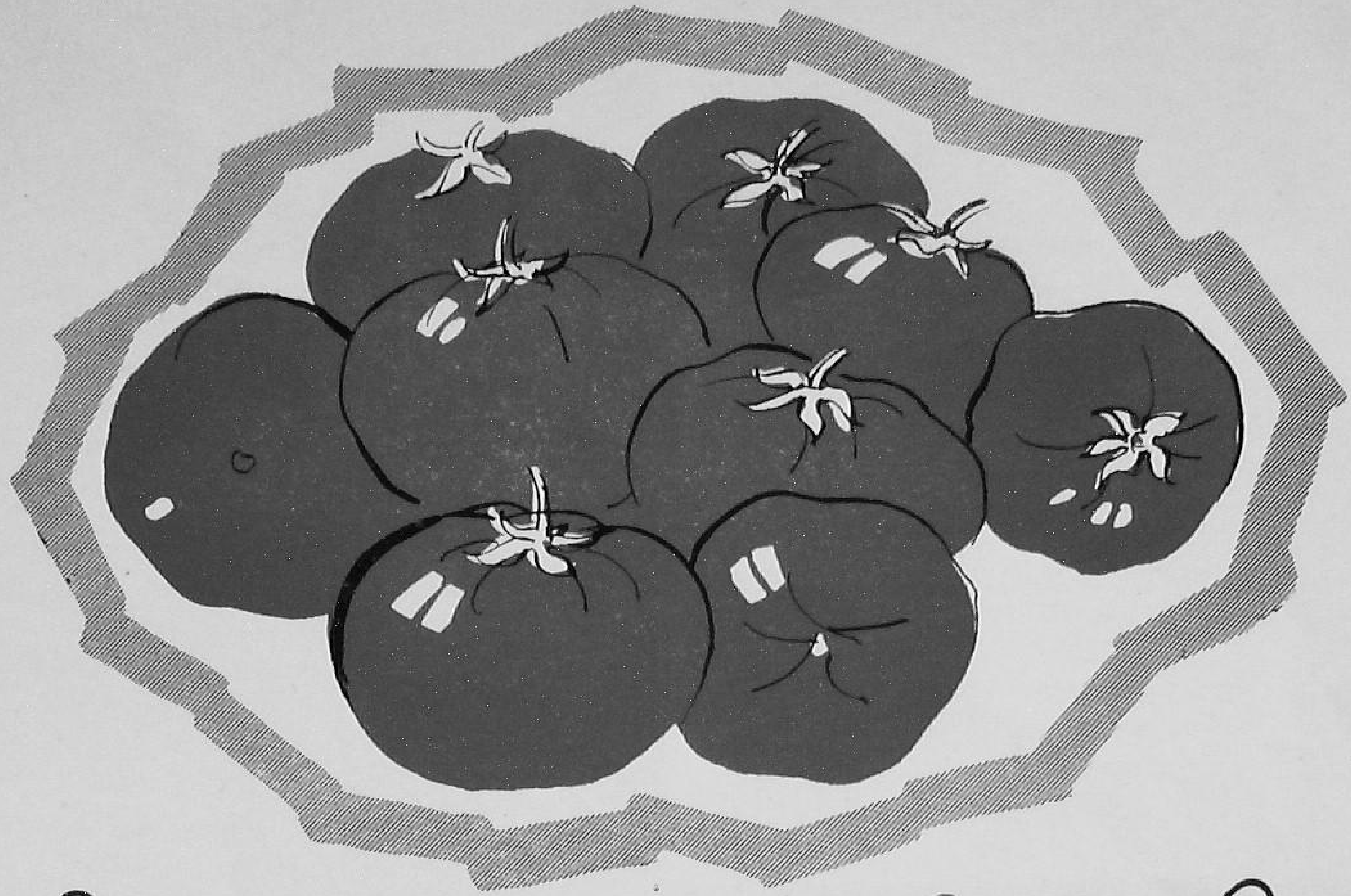
Recently, Package Programme officials introduced the cultivation of lettuce in a few places in the District. The area has a maximum temperature of 85°F and a minimum temperature of 55°F during the period from September to November. The average humidity during this period is 75 to 85 per cent and the rainfall is about 150 millimetres. The results show that lettuce can be grown successfully under conditions obtaining in the Cachar District. A plant on an average produced 50 leaves. A healthy plant weighed as much as ½ kilogram.

Lettuces are of various types—head-type, stem-type and leaf-type. The leaf-type variety *Slobolt* is quick growing, and is recommended for cultivation in the area.

Sow the seed during September-October. Transplant the seedlings during October-November at a spacing of 1½ feet by 1½ feet. Pluck the leaves after six weeks. If left unplucked, the leaves will become fibrous and taste bitter. With the approach of summer, the leaves lose their quality.

Lettuce requires a quick-acting fertilizer. Give one teaspoonful of ammonium sulphate per plant at an interval of ten days. This will ensure a healthy growth of the plants.

Lettuce leaves are yellowish green. They are frilled in structure. The plants look ornamental. They serve both as a vegetable and an ornamental plant when grown in a home garden. This lettuce seed can be obtained from the Division of Horticulture, Indian Agricultural Research Institute, New Delhi-12.



TOMATOES
GROW THEM ALL THE YEAR ROUND

By
V. S. RANGACHARLU and R. RAMCHANDER
Horticulturist *Assistant Horticulturist*
Hyderabad

TOMATO—is it a fruit or a vegetable? Some say it is a fruit, while others call it a vegetable. The answer is: it is both; but that does not make much difference.

The thing that matters is that people everywhere like tomatoes whether as a cooked vegetable or salad or condiment. Housewives prepare soup, *chutney*, ketchup, jam and curries out of tomatoes.

Besides being tasty, tomato is rich in Vitamin C—being the richest known source of this Vitamin among the vegetables. It contains almost half as much Vitamin C as is contained in an orange or a lemon.

To the tomato-growers, whether in the field or in the kitchen garden, it is a very rewarding crop. That is why more and more farmers are taking to tomato-growing. Hence you have to see it that the tomatoes you grow are very good in quality to fetch a good price in the market.

WHERE AND WHEN TO GROW TOMATOES

The tomato grows almost everywhere (from the sea level up to an elevation of 7,000 feet or even more) and almost throughout the year. If you are living in an area where the climate is mild, you can raise the crop any time you like but if it is a tropical area you will find rainy and winter seasons the best time.

So there are two main seasons for growing tomatoes—the early rainy and the winter seasons.

For the early rainy season crop, sow the seeds in May-June, and for the winter season crop, sow

between October and November. You can also raise a summer crop of tomatoes in places where the heat is not very severe and you have enough water for irrigation.

As regards the soil, almost all kinds of soils varying from sandy loams to heavier clays are good for tomatoes, though a rich loamy soil is the best. Avoid waterlogged, alkaline and saline soils, however.

WHAT VARIETIES?

There are a large number of varieties for you to choose from, of course depending on the local conditions and taste. The varieties range from light red to yellow in colour and in size and shape from small round to big and irregular and heart-shaped fruits. They can be moderate to heavy bearers. Some are known for a pleasant flavour and others are good for preserving.

Here are some favourite varieties.

Best of all: It is a heavy yielder and produces smooth fruits.

Early Market: An early variety, is also a heavy yielder of fruits.

Ponderosa: Large-fruited and heavy yielder, but its fruits are not of good shape.

Margloble: A moderate bearer, it produces fruits of a good flavour.

Bonny Best: An early bearer of solid, round and juicy fruits.

Pusa Ruby: It is a bushy, branching type; a heavy bearer of greenish yellow fruits.

Sioux: It bears thick-fleshed, round, light red fruits.

Ox-heart: A late variety; bears large heart-shaped, pinkish fruits.

Golden Queen: A heavy yielder of roundish yellow fruits of good quality.

Cheery Red: It bears clusters of small red-coloured fruits.

Sioux: It is a commercial type with medium-sized, roundish fruits; is also a heavy yielder.

A word for the kitchen gardeners—grow more than one variety for catering to different tastes of the family and also for securing fruits over a long period.

SOWING

Sow seeds in the nursery and then transplant the seedlings in the field. But to get plants which will yield high you have to take good care in raising the seedlings. Remember, the healthier and stronger the seedlings in the nursery stage, better will be the harvest from them in the field.

Go in for raised beds as against flat beds, especially during the rainy season. The raised beds ensure a good drainage and also prevent 'damping off' in seedlings which occurs due to the stagnation of water in the beds. If there is a danger of frost, cover the young seedlings with a layer of leaves or straw.

Prepare raised beds about nine inches high, two to three feet wide and conveniently long, in an open sunny place. See to it that the soil of the bed is well-powdered and manured. Mix well-rotted organic manures or decayed leaf-mould with the top-soil of the bed.

After you have prepared the beds, broadcast the seeds (heavy ones) thinly and evenly, or in lines four to six inches apart. Cover the seeds with a thin layer of finely-sieved soil or leaf-mould, and water with a sprinkling-can, taking care to avoid the top-soil being washed away.

The seedlings break the ground after about seven to ten days of sowing. Thin them out when they attain some height to avoid overcrowding. Remove the weak seedlings also.

When the seedlings are about two weeks old and attain a height of about six to nine inches, they are fit for transplanting.

For the home-garden, you can raise seedlings in pots or pans the same way as you raise them in a nursery.

An ounce of seed will give roughly 1,500 to 2,000 seedlings, and 3 to 6 ounces will be sufficient for getting seedlings for planting an acre.

TRANSPLANT CORRECTLY

Plough the field thoroughly and bring the soil to a fine tilth of a mellow texture. In loamy soils of average fertility, add 15 to 20 cartloads of well-rotted farmyard manure per acre while preparing the land, and mix well with the soil. Apply about two to three hundredweights of superphosphate also at the same time.

Divide the land into beds of a convenient size or ridges and furrows. Where flood irrigation is possible, plant on ridges. For planting during the rainy season, ridges are better than the flat beds; for they permit a proper drainage.

Plant with a spacing of about 3 feet between the rows and 2 to 2½ feet between the plants in a row.

Plant in the evenings, particularly in the hot seasons. With proper care, the transplanted seedlings will establish well within two to three weeks.

DON'T NEGLECT THE AFTERCARE

Weed and hoe periodically around the plants to secure a good growth of plants. As to how many times you should irrigate will depend on the prevailing weather conditions and the moisture-holding capacity of the soil. When it does not rain, irrigate once in a week or so particularly during the flowering and fruit development stages. However, see to it that the crop does not suffer from over or under-irrigation.

FERTILIZERS FOR TOMATOES

Tomato plants when fertilized yield well. Give about two hundredweights of ammonium sulphate and one to two hundredweights of potassium sulphate in split doses at intervals of two to three weeks starting three to four weeks after transplantation till the fruits set.

Place the fertilizers in-between the plant rows and mix well with the soil. Follow this up with a heavy irrigation. Where the temperature is high, cover the tomato field with mulch of soil or plant refuse. Mulching helps conserve moisture and keep down weeds, and thereby reduces irrigation and weeding costs and increases the yields.

PRUNING AND TRAINING ARE IMPORTANT

What is an ideal tomato plant? An ideal plant has only one or two main stems standing erect, with a few well-distributed laterals all round. Support the plants when they are about two months old. To do so drive stakes at suitable intervals and tie the lateral shoots of the plants to the horizontal scantlings fixed on the upright stakes.

Trim the plants periodically, eliminating the unwanted laterals by pinching or pruning them. You can also occasionally shorten the laterals, when the plants are growing too vigorously. In all cases, nip off the tips of the plants whenever they reach the stake height. While pruning, see that you do not remove the leaves on the main stem. Remove only the laterals on the side-shoots.

If you want fancy-sized fruits, reduce the number of laterals on a plant to three or four, and thin out the flower clusters and fruits. This will definitely mean reduced yields. So, only when you require fancy-sized fruits for exhibition or table decoration purposes, take to this practice.

It is not good to have tomato plants with low branches, since the fruits produced on such branches may be spoiled by coming into contact with the ground or irrigation water. Therefore, train the plants to high branching or provide suitable supports to keep the fruits off the ground. Remove all the suckers that arise at the base of each leaf after the required number of laterals are retained, as, otherwise, these will become branches, throwing the trained plants out of shape.

To sum up, proper pruning and staking will help plants get enough air and sunlight, so essential for the optimum growth and fruit development; and ensure a better uniformity in fruit size and colour. There will be less spoilage of fruits and more ease and economy in cultivation and other operations.

REMEMBER TO CONTROL PESTS AND DISEASES

Caterpillars. These damage the leaves and shoots and also bore into the fruits. Destroy the insect-attacked fruits and spray 'Endrin' 20 per cent E.C. at 6 c.c. per gallon of water to effectively control the pest.

Mealy bugs. These insects suck up the plant sap and if you don't check the attack in time, all the plants may be infested and damaged. Use Parathion 15 per cent wettable powder at one pound in 25 gallons of water.

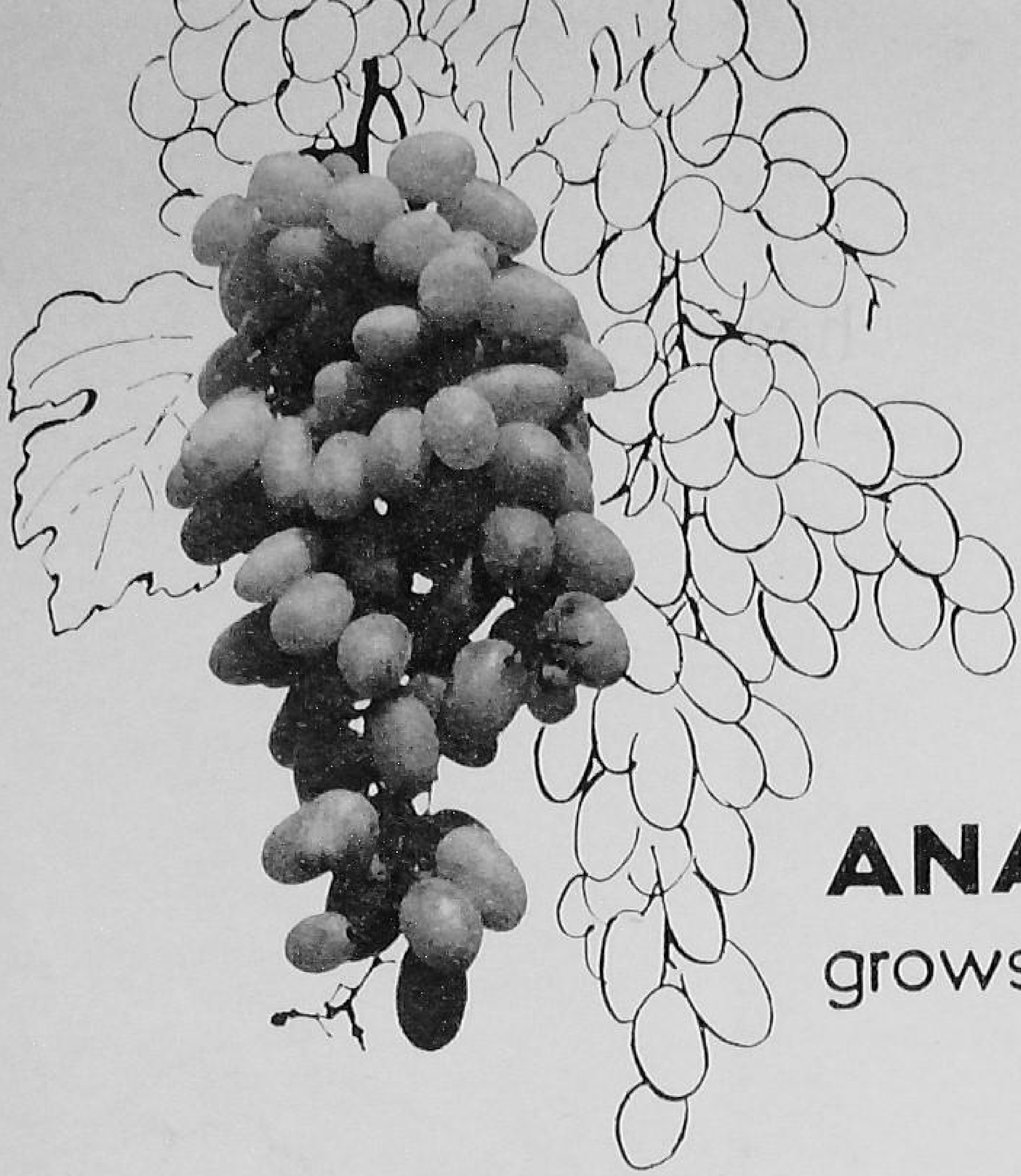
Fusarium wilt. When there is a sudden dropping of leaves and branches, followed by drying and death of the whole plant, you know it is fusarium wilt. Pull out the diseased plants and burn them to avoid further spread of the disease. A fortnightly drenching of the plants—down to the base—and soil with a 10 per cent Bordeaux mixture or Bouisol at the rate of one ounce in one gallon of water is helpful in controlling the spread of the disease. Also grow wilt-resistant varieties.

Blight disease. Spots develop on the leaves. Severely affected plants wither and die off. Spray Bordeaux mixture or any other copper fungicide in the initial stages.

Fruit rot. Soft spots appear on ripe fruits, and ultimately the whole fruit rots. A prompt destruction of affected fruits is the only remedy.

Leaf spot. Small, brown patches appear on the leaves. Spray Bordeaux mixture.

(*Turn to page* 25)



ANAB-E-SHAHI
grows in new regions

By
P. B. Sreeramachandra Murty
Gramsevak Training Centre
Samalkot, Andhra Pradesh

GROWING of *Anab-e-Shahi* need not be confined to a few selected areas only. New experiments point out that the grape-growing can be extended to many new areas now—even in areas with a rainfall of 30 inches or more and having a high humidity.

Shri Yerra Narayana Murty is an enterprising farmer who has taken good grape crops in his village Korupralu in Vishakapatnam District of Andhra Pradesh.

The soil on which he has grown his *Anab-e-Shahi* crop is red sandy loam and a little gravelly. He started grape cultivation from March, 1959. First, he dug three feet cube pits and after a fortnight filled the pits with layers of good earth (*pattimannu*) and compost. After the pits were settled, he planted 12 rooted cuttings in the pits in the month of May.

For planting, he followed the square system with a spacing of 12 feet by 12 feet. He took care to protect the cuttings from the hot sun by providing proper shade for them and pot-watered them once in three or four days.

In four months' time the cuttings grew into vines, each a six feet height. He took necessary and timely measures to save them from pests and diseases; also irrigated them once in 10 or 15 days.

Subsequently, he obtained more rooted cuttings. There were 36 vines in all.

He gave six baskets of farmyard manure, one pound of ammonium sulphate, one pound of superphosphate and five pounds of groundnut cake to each vine.

This much manure and fertilizer he applies once in June and again in December, every year, in circular pits made 2 to 2½ feet away from the base of the vines after digging the soil of the pits to a depth of six to nine inches.

Aware of the need for proper training of the grape vines he got a *pandal* erected which was provided with reinforced cement concrete posts and bamboos. These posts were fixed 12 feet apart; 49 posts were required in all.

Pruning is also no less important. In December, 1960 he pruned the vines to three buds on pencil-thick branches.

After pruning, he applied sulphur dust 4 times at 15 days intervals. Each time he used 4 pounds of the dust for his 36 vines.

In April 1961, there were 350 bunches of grapes which brought him Rs. 500.

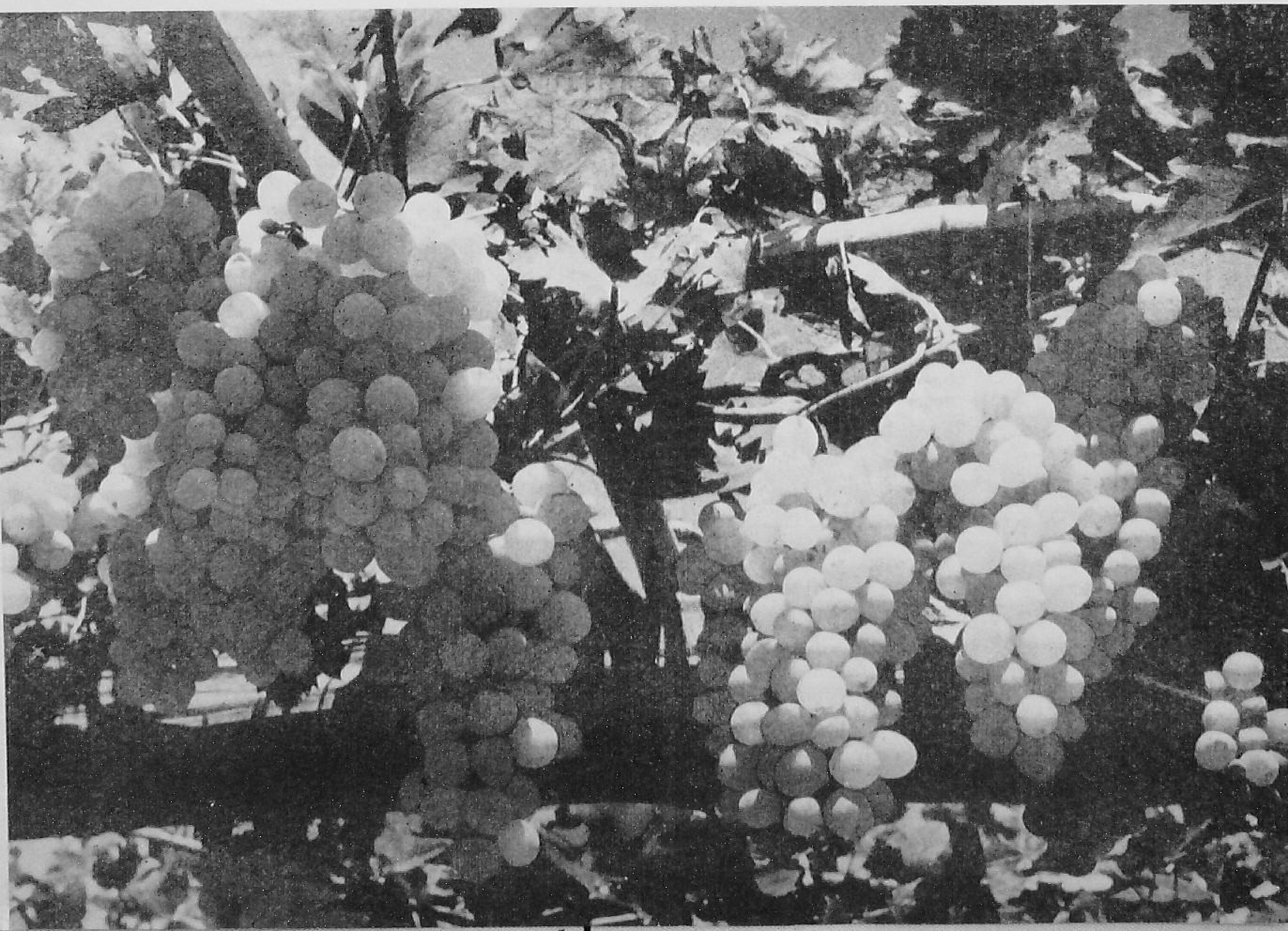
In May '61 he pruned the vines to one to two buds. For the second crop, he pruned again in December '61. In April '62, he got 1,000 bunches which he sold for Rs. 1,500.

The accounts Shri Murthy has maintained, show that he had to spend Rs. 2,000 in all from the time the vineyard was planted till the end of the harvest of the second crop. And he got back this amount from crop of the first year itself i.e., May '61 to May '62.

Now he has to spend Rs. 300 on his vines every year. He has already pawned his third harvest for Rs. 1,200.

He thinks his profit at present is not so high as it ought to be with *Anab-e-Shahi,* as he is not so well-versed with the pruning operations. He hopes, he can get three times more profit even under the same condition and with the same expenditure (Rs. 300) in future.

Anab-e-Shahi *can be grown successfully in many new areas, says grape-grower Murthy*



The kitchen garden that grows upward and yields no less than 30 different kinds of vegetables

Bottle-gourds (round variety)—just one of many kinds of gourds grown in the garden

BIG RESULTS FROM A SMALL KITCHEN GARDEN

THE plot is only 100 square yards but 30 different vegetables are grown on it—right from pumpkin to parsley. And that too in quantities sufficient not only for a family of five, but in plenty to be shared by three families for at least 10 days in a month. That's surely a smashing success !

Sounds unrealistic ? Better have a look at the plot. It is a complete kitchen garden in itself ! The plot is in the backyard of one of the apartments in Constitution House in New Delhi and Dutts are the gardeners. Dr. Dutt, a Specialist in Soils and Fertilizers in the

Onion are kept this way in the garden and picked as and when required

Regular weeding and irrigation in addition to heavy manuring are the secret of Dutts' success

Directorate of Extension, Ministry of Food and Agriculture, started growing vegetables in November 1962 as an answer to the call for growing more vegetables; Mrs. Champa Dutt has been a partner from the beginning and when Dr. Dutt is out of station, she looks after the garden all by herself. Their four children lend a helping hand. No *mali* is employed.

The first harvest of winter vegetables from their garden included, asparagus, curry leaf, papaya, mints, spinach, three varieties of amaranthus, *poi*, celery, parsley, two varieties of onion, two varieties of dwarf bean, asparagus, bean, *lobia,* tomato, two varieties of brinjal, four varieties of green pepper, two types of chillies, musk-melon, water-melon, cucumber, pumpkin, three varieties of bottle-gourd, ash-gourd, bitter-gourd, sponge-gourd, *parwal, kakrol,* beet and *bhindi*.

Following the harvest of winter vegetables, they have sown summer vegetables—30 different kinds again! It is not merely that they grow varied kinds, the yields are also prolific. The summer crop of *bhindi* which they planted in January has started

Papaya, ash-gourd, poi *(green vegetable) capsicum, etc., are growing in a plot, 1½ feet square, which was heavily manured and fertilized*

yielding half a pound every alternate day from March and is still continuing.

What's the secret? You might be wondering. A very high dose of manure and fertilizers—much higher than what is usually recommended—proper planning and of course hard labour. Their kitchen garden received one ton each of ammonium sulphate, superphosphate, sulphate of potash, mustard cake and magnasium sulphate in addition to 30 pounds each of borax and zinc sulphate. He added the minor plant food elements to make good the deficiencies as are found in the soils of Delhi.

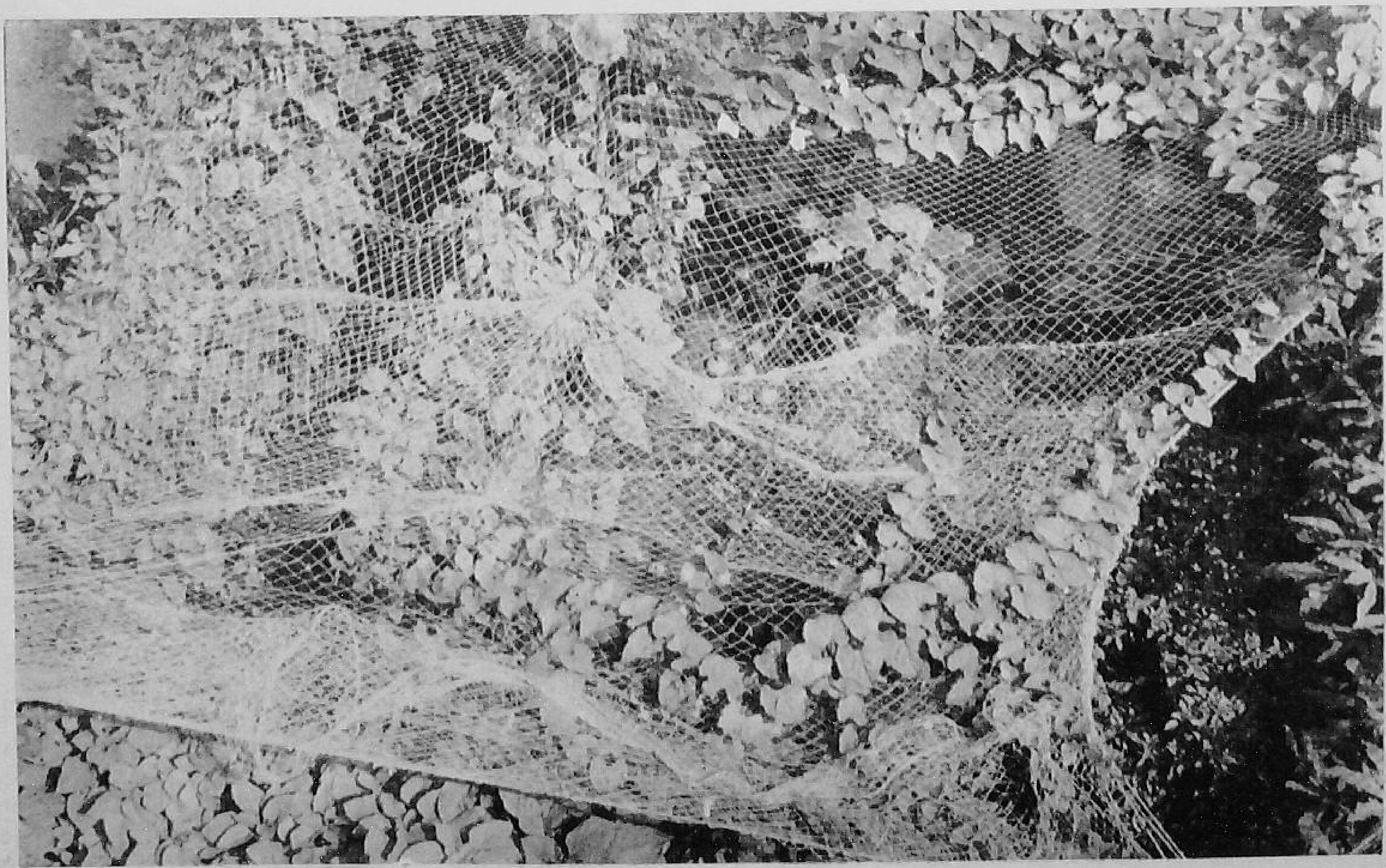
Following the fertilization, the land was heavily irrigated. With this much of fertilizer stuffed in, Dr. Dutt says that there will not be any necessity for adding more for full three years (three crops in a year).

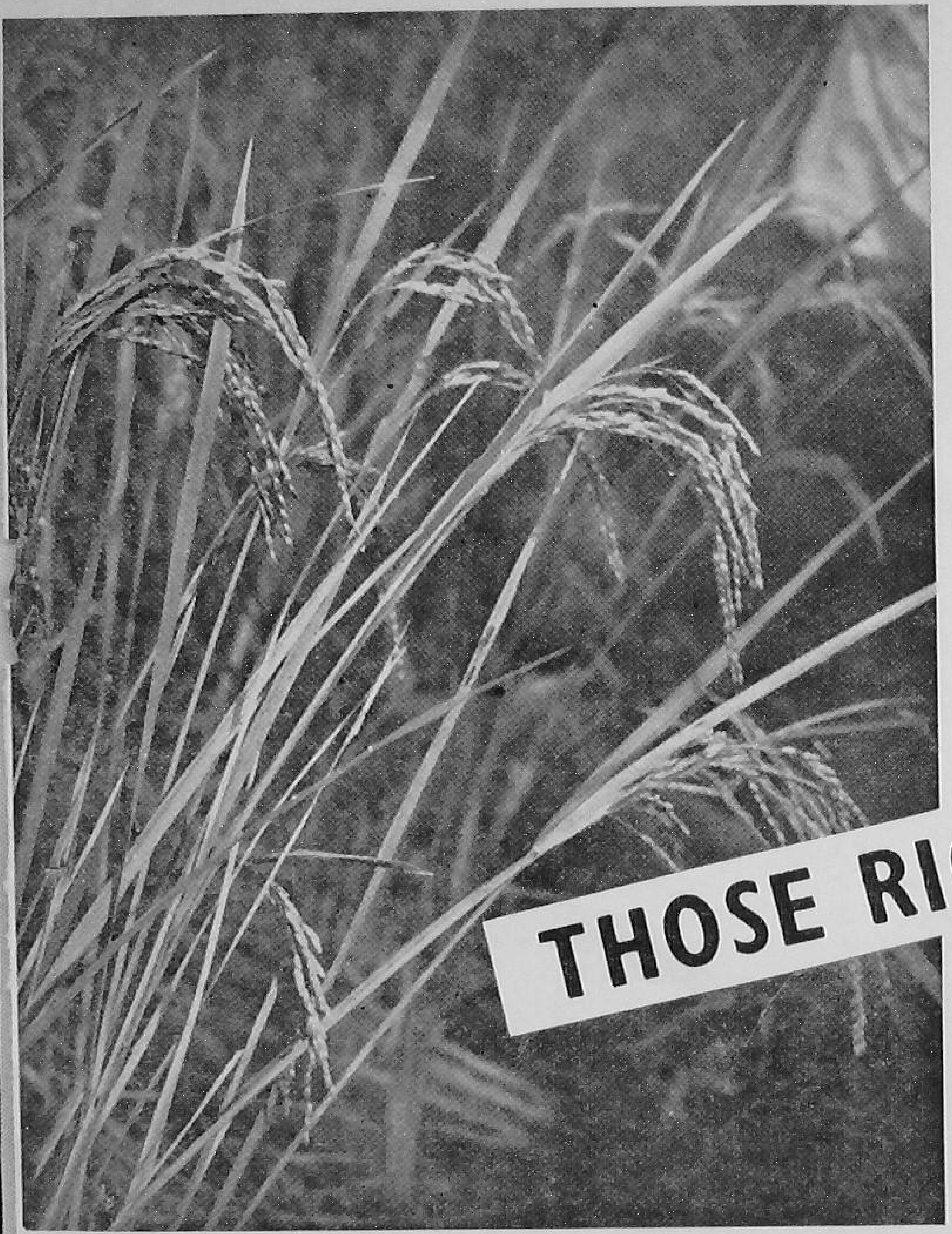
Moreover, such heavy manuring and fertilization have enabled him to accommodate a larger number of plants per unit area by reducing the spacing between the rows and plants. Take for example the *bhindi* crop. They have adopted a spacing of one foot between the rows against the usual two feet, and one inch from plant to plant or so against the recommended six inches spacing. The result? Twenty-two and a half

(*Turn to page 25*)

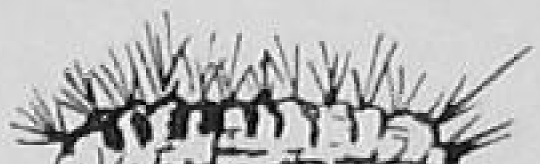
Harvesting is fun especially when it is in your own garden

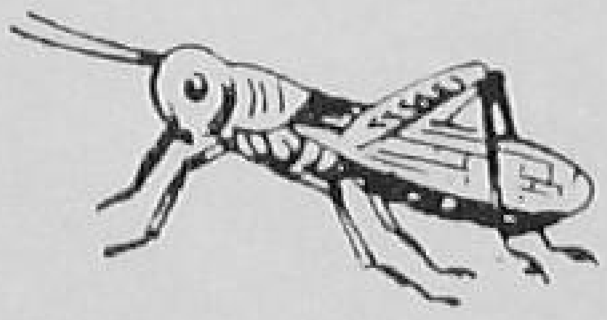
Parvals growing over the net and bushy vegetables growing under the net—that's how Dutts make the most of the small plot





THOSE RICE ENEMIES!





By D. B. REDDY
Plant Protection Specialist
Directorate of Extension
New Delhi

RICE has many enemies—some serious and some not so serious.

Serious ones include insect pests like swarming caterpillars armyworms, gall fly, grasshoppers, rice hispa, blue beetle, stem borer, jassids, caseworms and *gundhy* bug, and diseases like brown spot and stem rot. And then there are also rats damaging the rice crop before and after earing.

Some diseases like foot rot and brown spot are carried on the seed. These diseases kill the germinating seeds and the seedlings or make the growing plant

CON
PESTS AND DISE

GUNDHI BUG
Dust 10% BHC

HAIRY CATERPILLAR
Dust 10% BHC

PADDY BLAST
1. Treat seeds with organo-mercurial compounds.
2. Spray the crop with 5:5:50 Bordeaux mixture.

CASEWORM
1. Flood with water, pour kerosene and drag rope across the field.
2. Dust with 10% BHC

CLIMBING CUTWORM
Dust 10% BHC or spray 0.03% 'Endrin'

PADDY STEM BORER
Spray the crop with, 0.03% Parathion or 0.03% 'Endrin'

TROL
ASES OF PADDY

very weak. You can avoid these two by treating the seed before sowing. To treat, mix an organo-mercurial compound (one per cent active material) with the seed in a seed-treating drum (or other suitable seed-treating appliance) at 1 to 400 parts of seed by weight, *i.e.*, one chhatak of the chemical in 25 seers of seed, and rotate.

Swarming caterpillars, stem borers, hispa, gall fly, grasshoppers, blast and brown spot attack the rice plants in the nursery stage.

The swarming caterpillars march like an army from field to field, eating away all the greens on their way. You can check these caterpillars by dusting 10 per cent BHC or 5 per cent DDT at 15 to 20 pounds per acre or by spraying the crop with 50 per cent DDT (wettable) at one pound in 20 gallons of water or one ounce of Endrin (20 per cent E.C.) in 4 gallons of water.

In the same way you can get rid of the case-worm also. The case-worms are greenish caterpillars which cut leaves of the plants and make tubular cases and feed on the green matter. It usually attacks at a later stage of the crop growth. Since still water is particularly inviting to this pest, drain the fields in the case of a severe attack.

The rice hispa damages considerably the young plants. It is a black small beetle with spines. Sometimes, you will also find a small bluish beetle appearing with the rice hispa. Dusting 5 per cent BHC at 15 to 20 pounds per acre will control both these beetles. If the nursery is attacked by the rice hispa, clip off the leaf tips while transplanting, and destroy them.

Gall fly in certain areas and under certain conditions does a considerable damage. As a result, the rice plant gets a pale, white or violet look with a hollow out-growth commonly called silver shoot. In addition to the control measures applied against the stem borer, set up light-traps also to attract the adult flies.

GET

A BETTER YIELD

FROM

EVERY FIELD

Stem borer is the most serious insect pest of rice. However, it is most active during the *rabi* season. The attacked young plants show dead hearts and the older plants empty earheads. You can control effectively by regularly spraying with Parathion at the rate of one ounce in 12 gallons of water or with Endrin at one ounce in 4 gallons of water.

During the nursery stage or a little later, rice can be attacked by brown spot and blast. You can check both these diseases by spraying the crop with 5:50:50 Bordeaux mixture or a copper fungicide at one pound in 30 gallons of water. In areas where blast is of regular occurrence, sow rice varieties which are resistant to this disease.

Grasshoppers, both big and small, attack the crop and sometimes do a considerable damage at any stage of the crop. However, you can easily get rid of them by dusting with 10 per cent BHC at 15 to 20 pounds per acre.

Jassids, greenish and whitish small insects, suck the sap from the leaves and make them dry. Spray either with 5 per cent DDT or 50 per cent DDT wettable powder at one pound in 30 gallons of water to control them effectively.

The adult and the young *gundhy* bugs attack the crop when it is in the earhead stage. They suck the juice from the grains and make them empty. They are most active during September-October. *Gundhy* bugs get their name from their stinking smell. This pest is usually controlled by dusting the crop with 10 per cent BHC at 15 to 20 pounds per acre.

Apart from these pests and diseases, rice has another enemy—weeds. Weeds not only compete with rice crop for food, water, space and light but also serve as hosts for insects and diseases. Therefore, remove weeds in time and effectively. A word of caution : although hormone-type weed-killers have been used against certain weeds in rice, better use these herbicides only under expert advice.

(*Turn to page* 25)

Bananas

bag profits for him

By R. HALI

SHRI KURIAKOSE of Moovattupuzha in Kerala cultivates paddy, pepper, ginger and tapioca. But his pet crop is the Nendran banana. There is reason for it: it helps him bag a profit of no less than Rs. 1,700 every year and that too just from a half an acre plot!

Of course, this is not sheer luck; it is the result of hard toil and proper knowledge of farming.

He is very particular right from the beginning. He selects the suckers with great care either from his own disease-free plants or gets them from disease-free areas. To get healthy suckers he allows only two suckers to grow around the mother plants, and the rest he destroys.

He prepares trenches in August-September—2 feet deep and 2 feet wide of convenient length leaving a 10-foot space between the two trenches.

He uses rhizomes weighing about a kilogram each and sets them in the trenches with a spacing of 10 feet; then covers the rhizomes with soil. He finds the

second week of September ideal for planting bananas. After sowing, he places a bundle of dry leaves and plenty of wood-ash near the plants, but of course, not very near.

After four weeks of sowing, he puts plenty of well-decomposed pulverised sheep manure, dry leaves and half a pound of fertilizer mixture around the young plants, and covers them with soil scraped from the sides of the trench.

Before the North-east Monsoon comes to an end, he again places two bundles of dry leaves beside each plant. He also adds half a pound of banana mixture (8:8:16) to each plant and covers up with soil.

Irrigation begins from November. He prepares channels for irrigation and drainage. Irrigation is important in raising a good crop of Nendran. He irrigates on every alternate day without fail.

Next he top-dresses the plants with a mixture of sheep manure, wood-ash and dry leaves.

The banana flowers in the beginning of July. He then props up the fruit bunches with bamboos to prevent lodging.

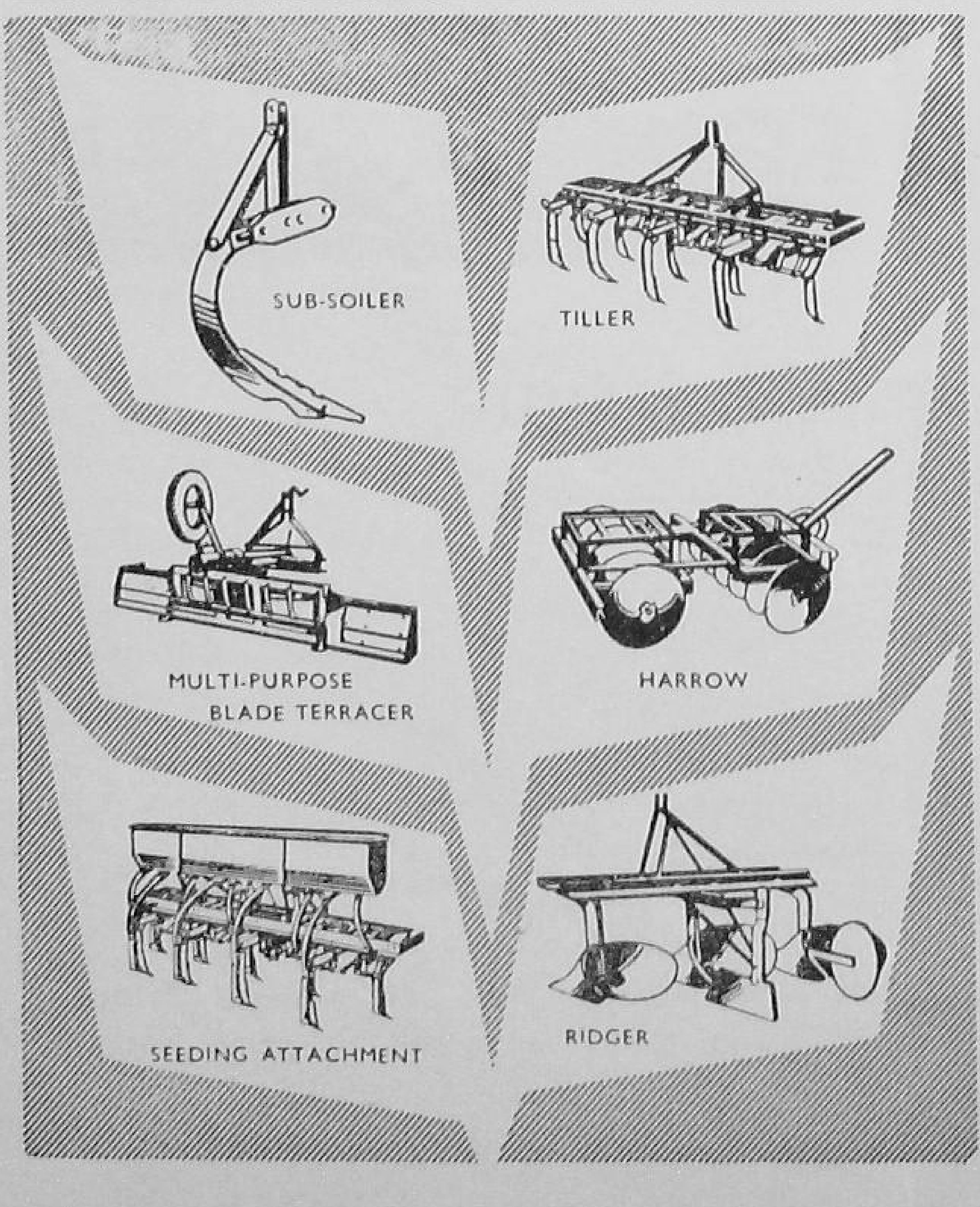
Bunchy-top disease is a nightmare to the banana grower in his area too. He avoids this disease by selecting disease-free suckers and dusting a 10 per cent BHC against the insects which carry the disease.

Banana-grower Kuriakose finds the local Agriculture Officer a helping hand whenever he puts a problem to him

The average number of fruits per bunch is between 90 and 100 and he gets Rs. 16 per banana bunch. Thus 200 banana plants bring him Rs. 2,000 from a half-an acre plot but he never has to spend more than Rs. 300.

"It is not the number but the size and weight of the fruits that decide the price. A few fingers weigh even more than a pound and a half each." he claims.

He is very happy about it and the buyers also are pleased to buy his produce.



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Scientists term it Ipomea carnea, *farmers call it* behaya (*shameless*) *and in western districts of Uttar Pradesh, it goes by the name of* hakim *doctor*

SADABAHAR

By R. P. DINGAR

A PLANT WITH MANY NAMES, MANY USES

SADABAHAR, a hardy plant, is of many uses to farmers. It thrives well under both dry and damp conditions. In Uttar Pradesh, it is known as *hakim* for the medicinal value of its leaves. It also makes a good protective hedge. It grows wild and hence the name *behaya.* The old stems after two years grow woody which make a good fuel. The plants are climbers and can be made to trail over the balconies and porticos in a beautiful fashion for ornamental purposes. It gives beautiful, tubular flowers which are stalked and whitish violet in colour.

Its roots go deep and form a tap root system. The stems are long, and whitish in colour and become semi-woody in texture some time after their sprouting. The leaves are green with elongated apex, with a little wavy margin and petiolate. The plants though climbers by nature, can grow bushy if trained.

It is commonly propagated by stem cuttings. The stems are cut into pieces, about eight to ten inches long with a good number of healthy buds, and the leaves removed. The cuttings are planted in beds—two to three feet apart from each other. The beds may be prepared at the spot where planting is needed.

Sadabahar may be planted around the compost pits, along the field borders or over the boundaries of a yard or in any waste land. It may also be grown over the banks of small riverlets in plains or around the tanks to check the soil erosion. As it thrives well under semi-dry conditions also, it may be grown on the eroded uneven lands (*i.e.,* gullies and ravines) for their reclamation.

For a good hedge, *sadabahar* has to be planted in two rows. For reclamation of eroded lands, dense planting is more suitable; while for decorating gates, porticos and verandas and balconies, a single plant in one bed will be sufficient.

Before planting, the soil of the bed should be mixed with one basketful of rotten cow-dung per cutting and the soil worked at least eight inches deep. The cutting should be planted in such a way that the upper half portion of the cutting is above ground and the lower end underneath the soil.

The best time for planting is during the rains. It can also be planted in February and March. Under dry conditions, however, it is better to plant during the rains. In places, where water stagnates during the rains, planting during February and March will be good. But in that case, an occasional watering in the early stages is essential.

The space around the young plants should be kept clean of weeds. The young plants cannot stand water-logging at all, even for short periods. Therefore, avoid waterlogging when the plants are young. After a few months, *sadabahar* plants become hard enough to face such conditions.

At the end of the first year, a light top-pruning should be done to promote a lateral growth. At the end of the second year, a heavy pruning is desired. All the plants, whether for protective, ornamental or for any other purpose except for the climbers, need a heavy pruning at least once a year. Climbers should be pruned only from the sides to promote the terminal growth. No top pruning need be done in this case.

A two-year old plant has to be pruned five times a year, and the lopping weighing about two to four maunds may be obtained. Fifty such plants may give all the matter necessary for preparing compost for manuring an acre of land every year (*i.e.*, about 100 to 150 maunds of compost per acre).

Cuttings ready for planting

In the western districts of Uttar Pradesh, farmers depend to a great extent for fuel needs upon this plant which they grow around their fields. The plaster of ground green leaves of this plant works as a good poultice on boils.

No pest or disease has been found damaging this plant, generally. Animals also do not damage it because of the bitter taste of its leaves. Because of this, *sadabahar* needs practically no care afterwards.

PLANT MORE TREES THIS TIME

A BUND-FORMER

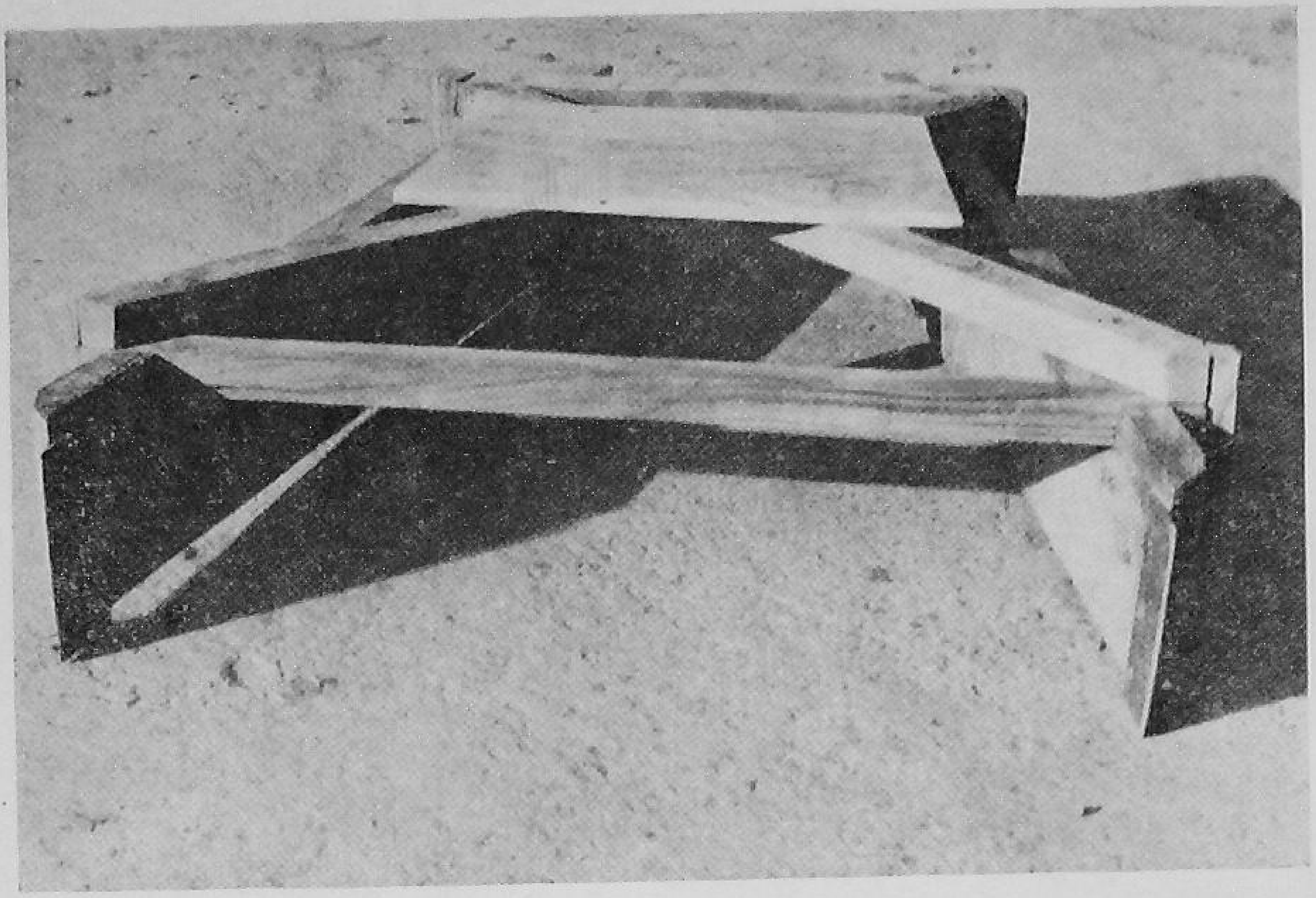
cheap yet efficient

By D. N. Kherdekar
Director, Agricultural Implements
Directorate of Extension
New Delhi

ALL FARMERS know that a bund-former is a useful implement for soil conservation and for preparing lands for planting some cash crops. But not all farmers can possess one, since bund-formers available in the market at present cost from Rs. 45 to 75, depending on the size.

Now here is a bund-former that can be got for just eight rupees. It can even be made for four rupees if you supply the wood to the village carpenter. It is simple in design and can be made out of local materials. But because it is so simple and cheap, it does not mean it is in any way less efficient than the already available ones.

Well-seasoned *babul* or any other hard wood goes to make its frame. To the frame are attached two plates



Any village artisan can make this simple bund-former

of 3 feet by 8 inches by ½ inch size which are bevelled at the bottom. The plates are fixed in such a way that the distance at the front is about 3 feet and at the rear about 10 inches. The arrangement is reinforced by cross-pieces and also by a plate on which the operator can either stand or sit to put his weight.

In the front portion of the implement are two steel pieces which can penetrate deep in the soil. These steel pieces are so fixed that they protrude half an inch from the front and also half an inch below the wooden plate. The cross-pieces help in strengthening the implement. A rope is fastened from the front to the yoke of the implement.

The size of the implement will depend on the types of bunds that are to be formed. For formation of 7 inches by 15 inches bunds, the bund-former shown here is adequate. If higher bunds are to be formed, the size of the implement has to be bigger. The bund-former can be pulled by a pair of medium-sized bullocks. The main precaution that has to be taken while yoking the animals, is to avoid tying them too close to the implement. The distance between the bullocks and the front edge of the implement should be at least 2 to 2½ feet.

Before using this implement, the land has to be ploughed or harrowed and made soft. This implement cannot dig the soil. It is only meant for collecting the soil and forming low bunds.

This implement can be got prepared by any village artisan if you can show the design. For prototypes of this implement or for any further information write to the Director, Agricultural Implements, Ministry of Food and Agriculture, Krishi Bhavan, New Delhi.

YOUR GOAL

BETTER AND STILL BETTER YIELDS

FARMER CHAUBE LIVES WITH HIS CROP

Farmer Chaube (right) *with Dr. Ram Subhag Singh, the Union Minister for Agriculture*

IN OCTOBER, 1962, farmer Radhikaraman Chaube of Babhnaul village in Dawath Block of Shahabad District, (Bihar) produced 40 maunds of *aus* paddy per acre and he is mighty proud of it. He ought to be as, according to him, this is nearly double the yield obtained at the Japanese Experimental Farm at Arra. This success was no fluke, for his wheat crop on the same land is equally promising. He hopes to harvest 45 maunds per acre—five maunds more than what he got last year and two to three times as much as the average in the area.

What is the secret of these big crops? Is it good seed? .... fertilizers? .... careful cultivation? .... or all put together? According to Shri Chaube, something more is necessary and that, is, EXPERIENCE, which he puts first. "It is not the materials alone but the way you use them to the best advantage of your crops, that counts for high yields," he said.

Every year he is getting to know better how he should match his crop and variety to the soil and the season. He is learning to tailor his fertilizer doses to the needs of the crop and the soil. He is developing a sixth sense, as it were, to determine when his crop requires irrigation and how much. These delicate adjustments between the soil, the crop, the variety and the season can be learnt only by experience and can be acquired only by close observation and by "continuous living with the crop."

Shri Chaube's quest for higher production is unending. He is currently experimenting with six varieties of wheat to find out which variety to grow and when.

The orchard of Shri Chaube is quite a museum of fruit plants and varieties. When told that, for commercial success, he should confine himself to one or two crops or varieties, his reply was characteristic: "How am I to know what variety is suitable for my farm and my market?"

Radhikaraman and his brother Shyamalan have formed quite a fine team. The one provides the ideas and the other executes them. They together farm a 55-acre holding of alluvial soil with a *murram* subsoil, and with facilities for irrigation from a canal.

When asked to describe the methods he employed for his 40-maund paddy crop, he reeled off the details in quick succession.

In the April of 1962, he raised a green manure crop of *dhaincha* with a dose of 2½ maunds of superphosphate. He irrigated it at intervals of 20 days. In

the meantime he raised a nursery of *Ch 62* paddy by Japanese method. When *dhaincha* was four feet high he ploughed it in. In July, he transplanted the three-week-old seedlings at distance of ten inches by ten inches. He applied a dose of ammonium sulphate before planting. Two weeks after planting he gave a second dose of the same fertilizer. He worked the rotary weeder at intervals of ten days. At the time of flowering there was an outbreak of *gundhi* bug pest which he controlled by dusting with BHC 5 per cent. He harvested the crop in October. He had experimented with *Ch 62* in small plots in previous years and when he found it suitable for his soil, he planted the whole area to this variety.

Radhikaraman's standing wheat crop is so uniformly thick and high that a man can easily hide himself without being discovered. What did he do to raise such a bumper crop? He was ready with his answers.

After harvesting the *aus* paddy, he ploughed the land thrice with the Shahabad plough. The field was allowed to weather for about ten days and then irrigated. The clods were crushed with a *patela*. After ploughing, the land was brought to a fine tilth with the *desi* plough. After each ploughing the clods were crushed with the *patela*.

Radhikaraman took no risks with his seed materials. Though he got improved wheat seeds of *NP* series *798, 824, 831, 835* and *No. 8* and *No. 259*, he treated them with an organo-mercurial fungicide to protect the crop against seed-borne diseases. To prevent termite attack, 'Eldrin' was dusted on the field. Seeds were sown behind the plough at a distance of eight to nine inches. Urea was applied in split doses one at the time of sowing, another at the time of second irrigation and the third at the time of flowering.

Farmer Radhikaraman does not believe in resting on his oars. He is not satisfied with taking a 40-maunds paddy crop and a 45-maund wheat crop from the same land in one year alone. He wants to raise three crop—*aus* paddy, following with potato and maize. He has got his plan ready. He wants to go in for the *sathu* variety of potato which is of short duration and can be fitted in between paddy and maize. He proposes to sow maize in between potato rows so that the digging up of potatoes and earthing up of maize may be done in one operation.

He is confident that he and his brother can undertake these three-crop-a-year project. This confidence is no idle boast, for it is born out of their own experiment and experience.

—M. L. N.

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TOMATOES (From page 7)

Brown rot of green fruits. Unripe fruits begin to rot when this disease attacks the plants. To prevent the disease, avoid waterlogging. Proper staking and training of the plants will also help in preventing this rot.

Little leaf. Due to this disease, leaves and shoots get stunted and the plants do not bear fruit. Prompt destruction of affected plants will help in stemming the disease from further spread.

AND FINALLY HARVESTING

The fruits are ready for harvest nearly three months after planting. For home use, you may allow the fruits to ripen on the plants, but if you have to send them to the market, better harvest when they are about to change colour. A single plant can yield one to six pounds of fruit and the acre-yield may range from 10,000 to 20,000 pounds.

●

KITCHEN GARDEN (From page 12)

pounds of produce from a 5 feet by 10 feet area within a period of three months.

Even then one cannot imagine 30 different kinds growing on one-fifth of an acre. The cucurbits and vine crops alone will need this much area to spread. Here comes the need for planning.

Cucumbers, pumpkins and melon, ash-gourds, *poi,* green pepper are trailed on the roof or supports—sometimes on the bushy plants (with care to see which bushy types can stand shade and how much) in such a way that they form a canopy over the plot. Thus the land is left for growing a plant each of brinjal and papaya. What's more all the plants are healthy and heavy yielding. Such a thing is possible because the soil is dug deep and manures supplied in plenty.

Now, you would surely like to know the expenditure side. Their investment on hose-pipes, fencing material, breaking of land etc., was Rs. 75. For seed, manures and fertilizers etc., they had to spend Rs. 55. The total value of the produce they harvested was about Rs. 100 per month. So far they have harvested the produce worth Rs. 300.

Dutts' kitchen garden has a lesson for all. Whether you are in a town or in a village, if you have got some space, you can always grow vegetables sufficient to meet your family's needs, if not more.

●

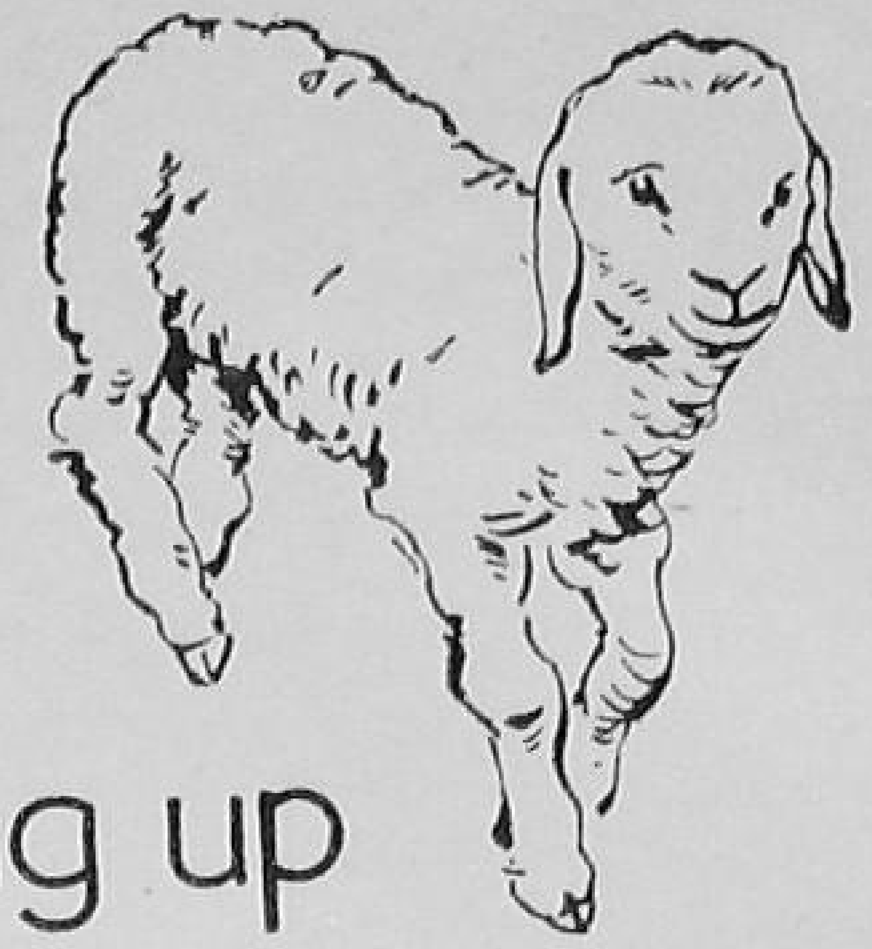
RICE ENEMIES (From page 16)

Rats dig up seed-beds and damage the growing seedlings. They cut the plants before they flower and also cut the ripe earheads and store them in burrows. You should kill rats either by using traps of various kinds, or by digging the burrows and using poison baits of zinc phosphide, or by pumping cyano-gas dust into the burrows and closing them tightly.

Sometimes crabs and snails damage the rice crop. Crabs not only cut the plant at the ground level but also make holes in the field, bunds and irrigation channels. Where the crab trouble is serious, use a poison bait containing 50 per cent DDT in boiled rice at ⅛th of an ounce of bait per burrow or 0.025 per cent Warfarin in popped rice. Wherever possible, dust cyano-gas into the burrows to kill the crabs.

You can combine some of the control measures suggested here. This will mean a lot of saving of labour, and money. The control of swarming caterpillars, grasshoppers, *gundhy* bugs and rats would require a community action and cooperative effort. Such an effort can be extended for the control of other pests and diseases also.

Some of the pesticides such as Endrin, organo-mercurial compounds, Parathion and zinc phosphide are highly poisonous and should be handled and used with great care and attention. If any seed treated with an organo-mercurial compound is left over, it should not be used for consumption either by man or animal.



Bringing up A LAMB

By
GULZAR SINGH
Extension Officer, Banjar (Kangra), Punjab

'Well begun, half done' is equally true in the case of lambs also. A good care in the beginning goes a long way in getting good flocks afterwards.

HOW profitable sheep farming can be depends on the way lambs are brought up.

If the lambs are properly-cared for and fed well, they will grow up to form a healthy flock. And healthy flock will give more meat, more wool and high profits.

It is said, excepting for its bleat, every part of a sheep is useful. It gives wool and leather, provides milk and meat, and also a good manure for the crops. But in return it does not get the proper care it deserves for its welfare. As a result, average production per sheep is at a constant low level.

Care of a lamb should start right from the time it is born, or rather even before it is born. Ewes that get good care and receive the right type of food produce more, big and strong lambs.

Ewes conceived in March-April deliver healthy lambs in August-September. This is because the ewes get a good deal of green grass during their gestation period. Also the August-September born lambs thrive better than the ones born in April. This is because the April-born ones have to face the hot summer. Besides, sheep in-milk dry up during summer. As a result, the April-born lambs are stunted in growth.

After the gestation period of 142 to 152 days, a healthy ewe delivers one lamb and occasionally even twins. Sheep can lamb twice a year but in that case the lambs will be too weak with a poor chance of survival. Therefore, the golden rule for having a good crop of healthy lambs is to get lambs once a year and that too, at the right time.

A healthy ewe needs no help while delivering. As the lambing time nears, the pregnant ewe lags behind or separates herself from the flock and delivers a lamb very peacefully. But see to it that the flock does not stray away from the lambing ewe.

When a lamb is delivered, its fore-legs with the head in-between come out first and then the rest of the body follows. If it doesn't happen this way, get the help of an experienced person.

As soon as a lamb is born, the mother ewe starts licking its body. If she doesn't do that, dust some salt and bran over the lamb's body. It will induce the ewe to lick the lamb.

Sever the umbilical cord of the lamb about three inches below the navel and treat it with tincture of iodine and sulphonamide powder.

A healthy lamb will stand on its legs within a few minutes of birth and then will skid to suckle the teats. But if it is weak, help it to suckle colustrum—the first milk which is a good cleansing agent.

If the weather is very cold or it is raining or there is a storm, keep the new-born lamb with the mother ewe in a warm clean place. See that there is plenty of space also.

If the mother ewe dies, provide a foster mother for the lamb. Any other ewe or else a goat (which must be reared in the flock for such an emergency) can make a foster mother.

A new-born lamb generally weighs 2½ to 5 kilograms in this country. During the first three months, it grows fast. The growth slows down when the lamb is weaned. Hence see that there is an arrangement for hand-feeding the lamb on soft and green grass.

It is a common practice to wean a lamb when it is three months old; for the milk in ewes starts drying up by then, if she is not properly fed with green grass. On the contrary, if green grass is made available in plenty, the ewe is able to feed the lamb up to five months because the green grass increases the milk-flow in an ewe.

Make it a point to train the lamb between three to five months of age to graze on the green grass, so that it can grow fast and produce more wool and meat.

If drought follows the weaning of the lamb, hand-feed the lamb on green grass; otherwise, it will remain underfed and as a result will be weak.

Feed the lamb on leguminous grasses when it is six to eight months old.

Allow the lambs to graze on good pastures, because they cannot nibble at the hard and long grass. Further, there is always a danger of the lambs being infested with worms if allowed to graze on bad pastures.

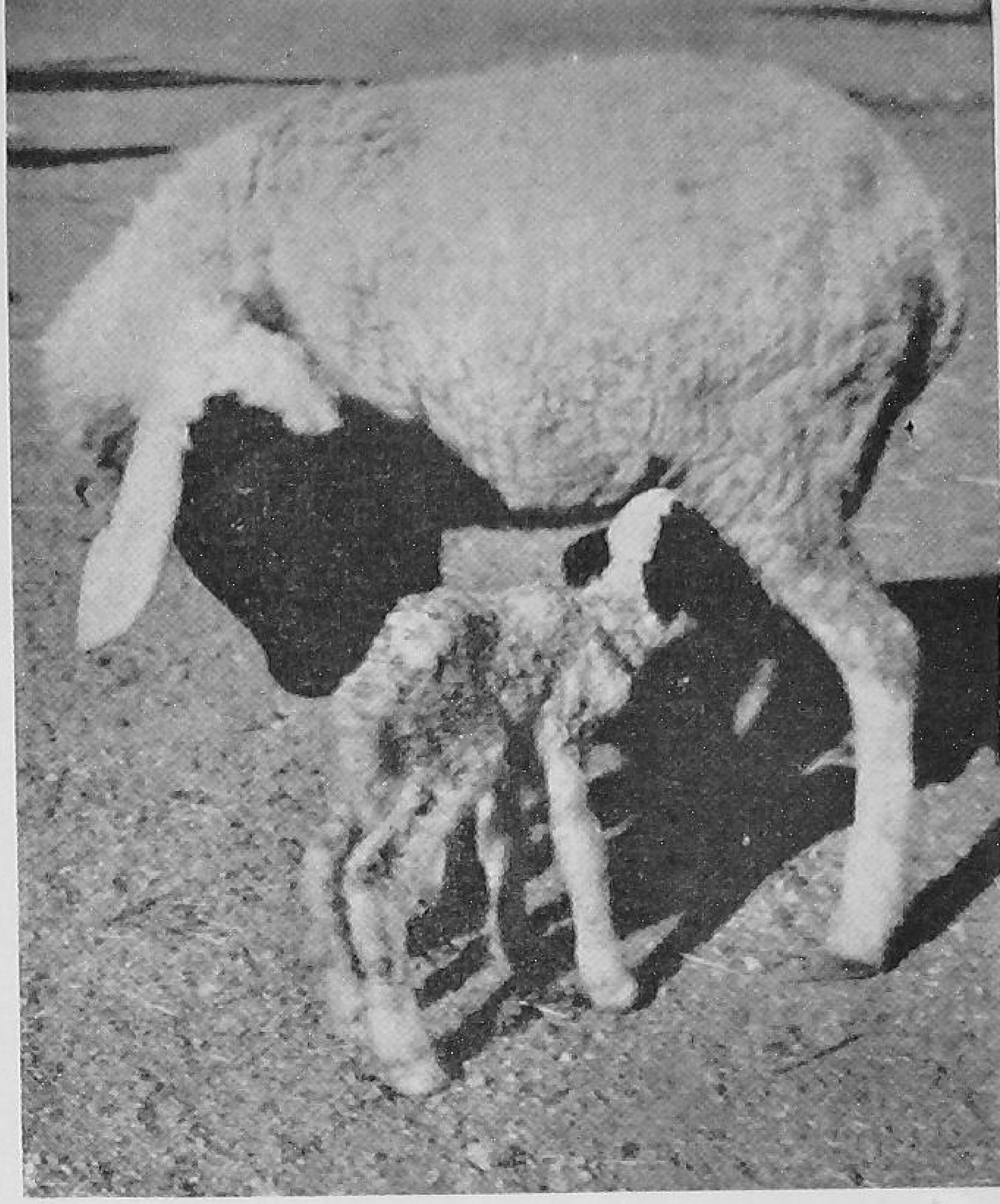
It is better to graze all the lambs in one flock separate from the general flock. But place a few dry ewes with the lamb flock, as they will guide the little ones to graze on the pasture and show the water source.

Also see to it that the lambs do not graze with the mother-ewes, for they go on teasing and disturbing the ewes. But place them with the mother-ewes at noon under a shady tree, so that they can suckle the milk.

Tatoo the lamb after it had been weaned for recognization and record.

Castrate all the male lambs which are not desired for breeding purposes at the age of 1 to 1½ months.

If in some lambs, the tail is unusually long, cut it off (but dress it up); otherwise the long tail soiled with foecal matter and urine may spoil the wool around.

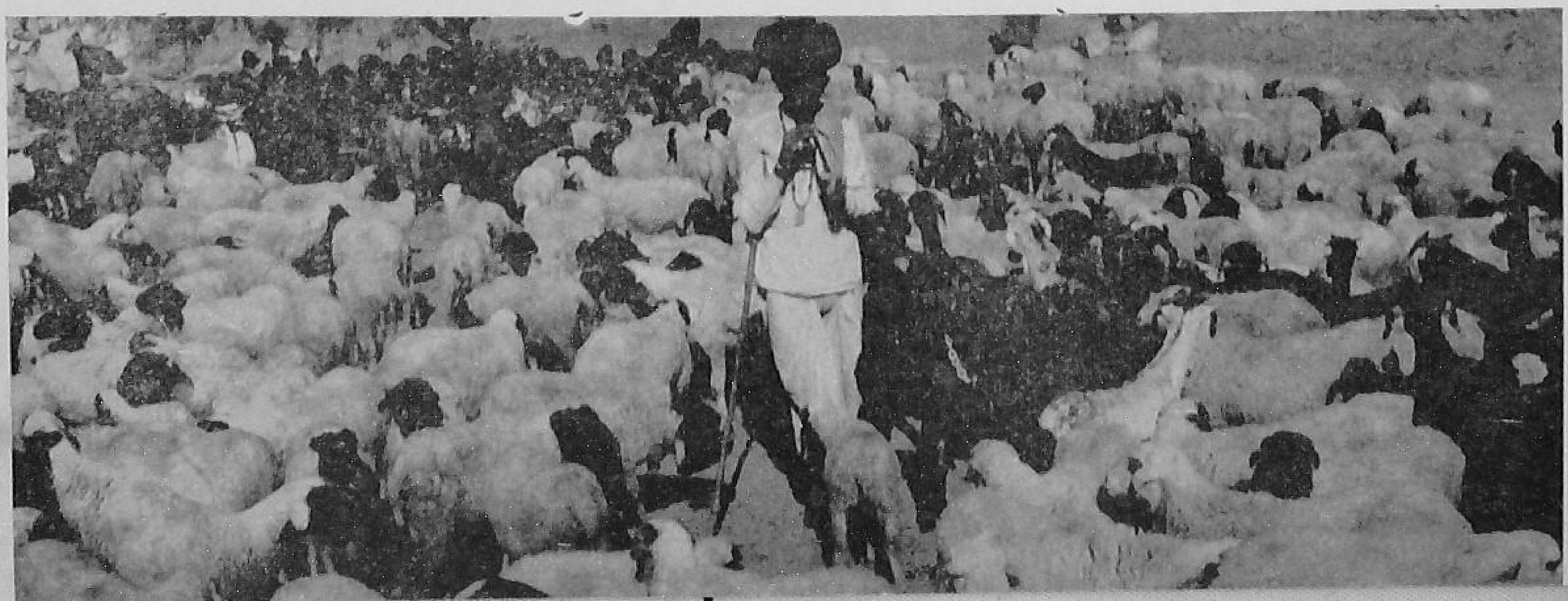


Healthy ewes produce healthy lambs

Dispose of the undesired but fattened lambs for mutton, so as to reduce the grazing pressure on the pasture.

These are the principles which you, as a sheep-breeder, should always bear in mind while rearing lambs. Help the lambs grow faster for good meat and better wool.

And healthy lambs make a healthy flock—a good source of income!



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